JUNIOR Scholastic

AT WORLD SERIES: JOE DIMAGGIO, YANKEE STAR, AUTOGRAPHING A BALL FOR BUD UTZ OF LARCHMONT JUNIOR HIGH SCHOOL

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THIS ISSUE: AIRPLANES • AVIATION • FLYING

OCTOBER 16
1937

THE WORLD AT WORK

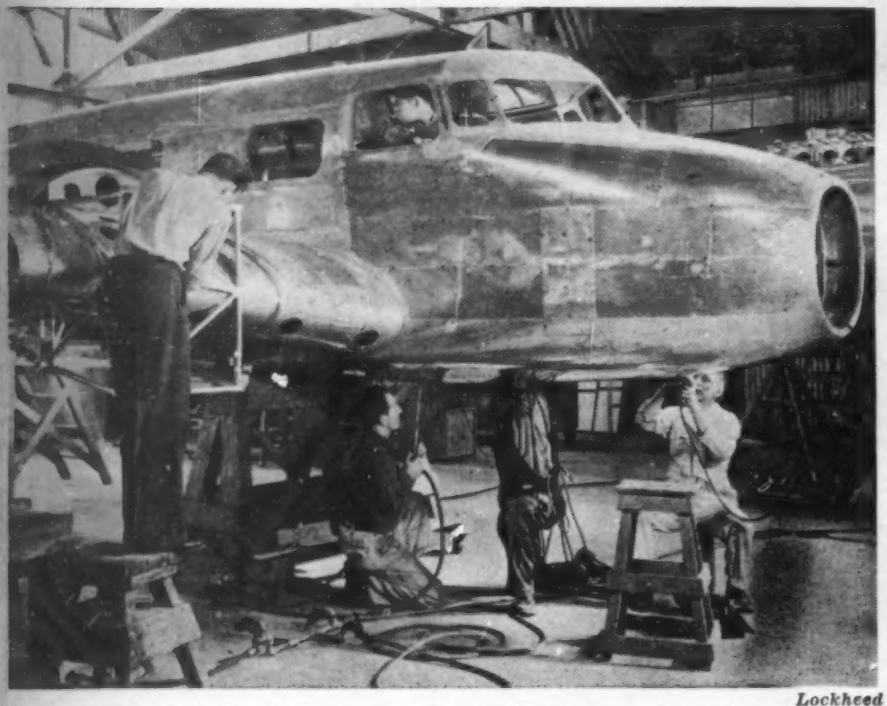
Junior Scholastic's Weekly Picture Page

The world's smallest plane! It is 12 feet in length, with 14-ft. wing spread, and a top speed of 225 miles per hour. It was built by five employes of the Consolidate Aircraft Co., San Diego, Calif., in spare time. Tony Levier, one of the builders, shown here.

Acme

Sovfoto

ABOVE: Hundreds of parachute jumpers come down at the same time! The photograph shows many of them in this "mass descent" which was staged by the Russian army. BELOW: A man dressed entirely in asbestos is always on duty aboard U. S. Navy aircraft carriers. Should a crash occur on deck, and a fire start, he rushes to the plane, and with cutting tools releases the pilot and passengers. You know asbestos won't burn.

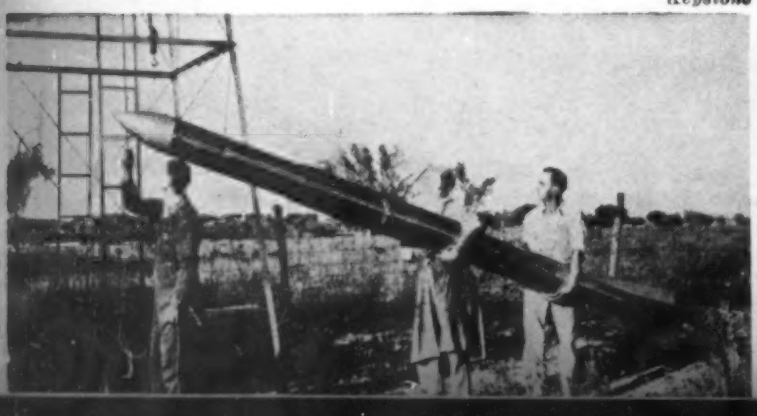


Lockheed

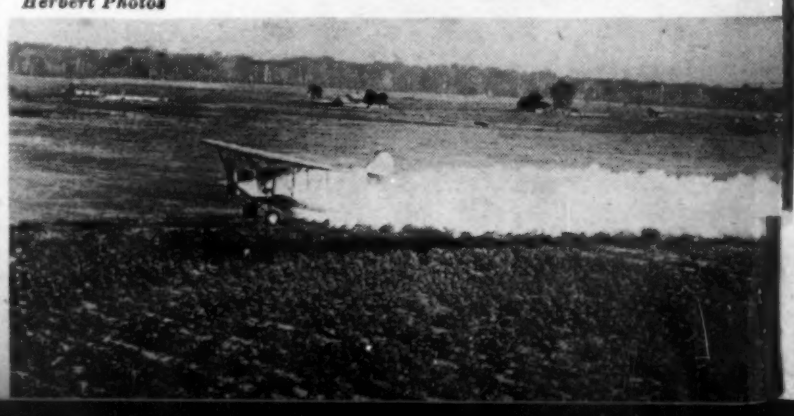
Official photograph U. S. Navy

ABOVE: Behind every airplane is the fine skill of many workers. Here workmen are attaching a Lockheed electra fuselage and center section to the frame. DIRECTLY BELOW: What does the future hold? Is the rocket the future "ship of space?" A scientist, Dr. Robbert H. Goddard, is experimenting with rocket flight at Roswell, N. M., where he and assistants have built a workshop and a tower from which the rockets are shot into the air. The picture gives you an idea of the size of the rockets. LOWER RIGHT: Airplanes are useful for more than transportation. Here we see one spraying cotton plants with a chemical to kill the boll weevil, which is so destructive to cotton plants in the South.

Keystone



Herbert Photos



MAN WANTED WINGS

He Has Always Had the Desire to Fly

EVERY day at four o'clock in the afternoon a great transport plane, a huge silver bird with two motors, flies over Bob's house on its way to Boston.

Reading their newspapers, the passengers sit safely in the huge ship of the air, knowing that in an hour they will be in Boston, 500 miles from where they started.

Perhaps they do not think about all the problems that had to be solved before they could board an airplane and fly through the air faster than the birds.

Perhaps they do not think that man has always wanted to fly, ever since he became aware of the world around him.

Do you remember the story of Icarus, the Grecian youth whose father in those ancient times was the inventor, Dedalus? Icarus and his father were caught by an enemy and imprisoned. Dedalus, casting about for a means of escape, built two pairs of wings that were made of feathers and held together by wax. He made a pair for his young son Icarus and a pair for himself. And he told Icarus to be careful when he flew; not to fly too near the sea, for the water might wet his wings, and not to fly too close to the sun, for the sun might melt the wax that held the wings together. But young Icarus, overjoyed by the thrill of flight, flew close to the sun, and the sun melted the wax of his wings and he fell into the sea and drowned. The sea is called the Icarian Sea to this day.

That, of course, is a fable, but it will give you an idea of how long man has wanted wings, and how he dreamed of them. The Bible speaks of this desire when it tells how Solomon wondered about "the way of a bird in the air."

For centuries man tried to copy the birds. Leonardo da Vinci, the great Italian artist who lived 400 years ago, studied the flight of birds, and made many pictures of them in his notebooks. He also drew a picture of a machine he thought would fly. No one knows whether he ever built it, but we know it could not have flown.

In the eighteenth century, two Frenchmen, the Montgolfier Brothers, who were paper-makers, tried experiments with paper balloons. They lit pieces of paper and held them under the open mouths of paper bags, and watched them go up in the air. The hot air carried them up, but they soon came down.

In 1675 a man named Besnier tried to fly with this set of wings. Looks funny to us.

N. Y. Public Library

The Montgolfier balloon went up when we were fighting the war of 1775.

Then, in 1783, they built a large balloon and filled it with hydrogen gas and sent it up in the presence of the French court. The balloon came to earth again with its passengers unhurt.

In the same year, a daring man named Pilatre de Rozier went up in a Montgolfier hot-air balloon, which was safely attached to the ground by a rope.

Balloons, and the dirigibles which came later, are called "lighter-than-air machines," and are not to be confused with "flying machines" which are "heavier-than-air" machines.

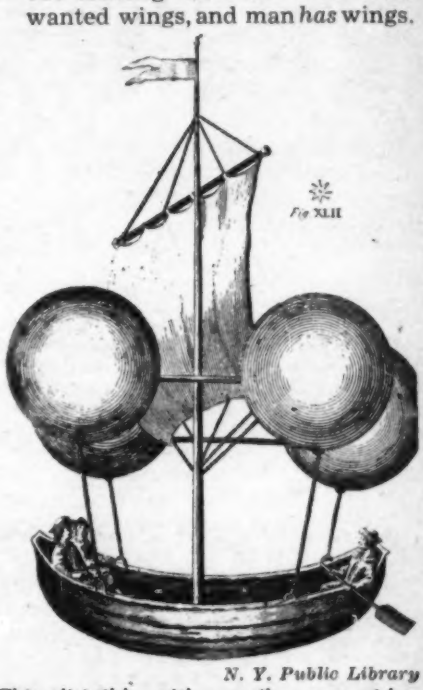
Balloons and dirigibles rise and stay in the air because the gas in their bags makes them lighter than the natural air. Puncture the bag and let the air escape, and down they must come.

Man, in his desire to fly, was thinking more of "flying machines." He wanted—not a bag of gas—but wings. See the drawings of Besnier on this page. Besnier's idea was not much different from those we occasionally hear about today when a man fastens wings to himself and drops from an airplane. But he takes along a parachute, just in case!

It is to the Wright Brothers that we owe the development of the modern "heavier-than-air" plane. They found that the two things necessary before a heavier-than-air machine could fly were "lift" and speed. The Wrights worked out the design of an airplane wing which could supply the lift; the engine supplied the speed, the forward motion.

It is still true today that for an airplane to remain in the air, it must have forward motion. When the engine is stopped, the plane must land, sooner or later

These principles of flight were successfully worked out only 34 years ago. Yet today huge liners of air cross the continent in 15 hours; they span the Atlantic and Pacific Oceans, safely carrying passengers and freight and mail. Specially built racing planes have crossed the United States in a little more than seven hours. Pilots from Russia have flown across the North Pole to America, over 6,000 miles without landing once for fuel. Man wanted wings, and man *has* wings.



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This dirigible with a sail was an idea that never got beyond the model stage.

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It is late at night but floodlights brighten the airport. Twelve passengers sleep aboard this plane as she wings her way across the continent in 17 to 18 hours.

We Take a Trip on an AIRLINER

YOU probably don't remember where you were ten years ago on the first day of September (1927). But you can bet your last parachute one man remembers where he was. He was riding in the mail compartment of a plane headed West.

He was the first passenger to travel from the Atlantic coast to the Pacific coast by airplane. He paid $400 to fly from New York to California. The trip took 33 hours. The plane made 20 stops on the way.

This plane was not the first to fly from coast-to-coast. The passenger was not the first person to ride in an airplane. People had been flying more than twenty years. Planes had been carrying Uncle Sam's mail over this route since 1918. But this man was the first paying passenger to fly across the country.

This was the beginning of coast-to-coast passenger air transportation.

It is more than a hop, skip, and a high jump from that day to this.

Larger planes have been built. These have space for air mail and air express. They also have comfortable cabins for passengers.

There is no longer an open cockpit for the pilot. There is a heated, glassed-in cabin at the nose of the plane. Now there are two pilots on transport planes. They also have a helper, a gyro-pilot. This is an automatic steering machine. It relieves the pilots of having to guide the plane all the time it is in the air.

The coast-to-coast trip now takes 17 hours westbound, 18 hours eastbound. The difference is due to winds. Going west, the plane usually has a tail wind behind it. Going east, it faces a head wind.

In the daytime there are seats for 21 passengers. They may read, write, play cards, chess, checkers, and other games, or they may sit and watch the clouds go by.

Recently sleeper planes have been added to transport service. You can leave New York in late afternoon, sleep through the night, and arrive in San Francisco by nine o'clock the next morning.

Suppose we take a trip on one of these new sleeper planes.

There are three transport air lines with daily coast-to-coast service (TWA, American and United airlines). Some planes leave Newark, N. J. (the airport for New York City passengers), late in the afternoon. Others at night. All arrive in California the next day.

Let's take one of the new United Air Lines Mainliners. Since this is our first trip, let's get the thrill of leaving at night.

The plane leaves Newark at 11 P.M. It arrives in San Francisco the next afternoon at 1:30. We can go aboard earlier than eleven and go to bed, if we like. But, of course, we *wouldn't* like. We want to be wide-awake at the takeoff.

You must make your reservation several days in advance. The sleeper has berths for only twelve passengers, although it can seat 21 people in the daytime.

You can make your reservation at the office of the air line in New York City or your local travel agent will do it for you. You must plan to be in New York at the air lines office at least an hour before your plane is scheduled to leave Newark.

Your one-way ticket will cost $158. This includes berth and meals.

When you pack your bags, you'd better leave the electric iron at home! In air travel every ounce of weight counts. You are allowed to carry 35 pounds of baggage free. Each pound over that amount must be paid for at 75 cents per extra pound.

A Mainliner can carry a total "pay load" of 5,600 pounds, which includes the weight of 21 passengers, the mail and freight, and the passengers' baggage. This is all paid for. The plane actually can lift twelve tons, besides its own weight.

When you arrive at the ticket office of the air lines, your baggage will be weighed. You receive your ticket and a baggage check. Hang onto the baggage check. You must use it to claim your baggage when you arrive in San Francisco. When you arrive at the airport (you ride in a 10-passenger limousine from New York to

Newark), you will give your ticket to the agent there. It will be returned to you on the plane.

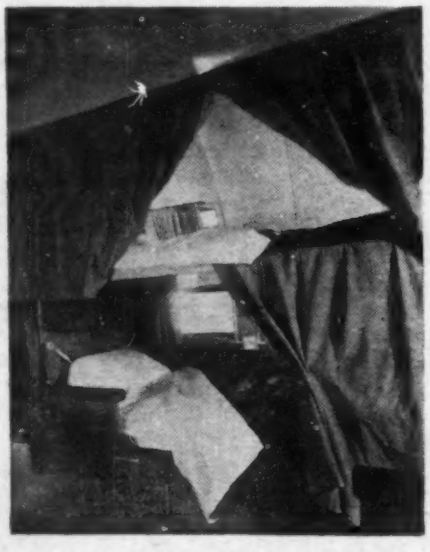
You will be given a leather overnight kit, provided with paper bedroom slippers. Into this you may transfer your night clothes, toothbrush, comb and other necessities. Then your baggage is placed in the baggage compartment. If your bag is small, you may keep it near you, under your berth.

Let's go outside and look at our plane. Several men will be loading the baggage compartments. One compartment is near the nose of the plane. The other near the tail. Besides passengers' baggage, the plane will carry air mail and air express. Express freight might include newsreels, news photographs, a Paris gown to a Hollywood star, or a rush-order piece of machinery for a factory in Denver. Even a dog might be crated and shipped air express. His ticket would cost $1 per pound of dog—the coast-to-coast air express rate.

All Aboard!

We see the place for the pilots in the cabin in the nose of the plane. But we do not see the pilots. They are inside the airport in the office of the operations department. They are talking with the weather men and other officials. The weather men tell them what kind of weather to expect between New York and the West coast, and how to avoid storms, if possible. If the weather is very bad, the officials may postpone the flight.

When the pilot goes aboard his plane, he carries a chart. This tells him what course he will fly, what altitude, weather conditions, and how much fuel he should use.



You fly by night with the greatest of ease. In the morning the hostess will serve you "breakfast in bed," if desired.

Happy landing! Here the passengers are alighting after a transcontinental trip. Little Sister is eager to tell Daddy about the funny bumps she felt in the road.

The air hostess serves hot meals aloft from an electric kitchen. Thermos jugs keep milk cold and "hot chocolate" hot.

A few minutes before time to take-off, you will hear "All Aboard" announced over a loud speaker at the airport. Let's go aboard.

You enter by walking up a four-step ladder and into a door near the tail of the plane. Inside a young lady in a gray uniform greets you. She is the plane's stewardess. Her job is to be hostess to all the passengers during their trip. (See "Jobs In Aviation" on page 14.)

The stewardess will ask you your names and show you which berth is yours. She will see that you are comfortable, and that you understand how to work the heating system in your berth. She will serve your meals —breakfast in bed, if you like. She will also return your ticket to you soon after the plane takes off.

We are taking off! Except for the whir of the motors, we'd hardly know we are moving. Look out the window of your berth. You can see we're rising from the ground. The lights of the airport are growing dimmer. They're further away. Perhaps your ears will tell you more than your eyes. They may begin to feel jumpy. When you swallow, your ears crackle. That's because of the thinner air (less atmospheric pressure) the higher you go.

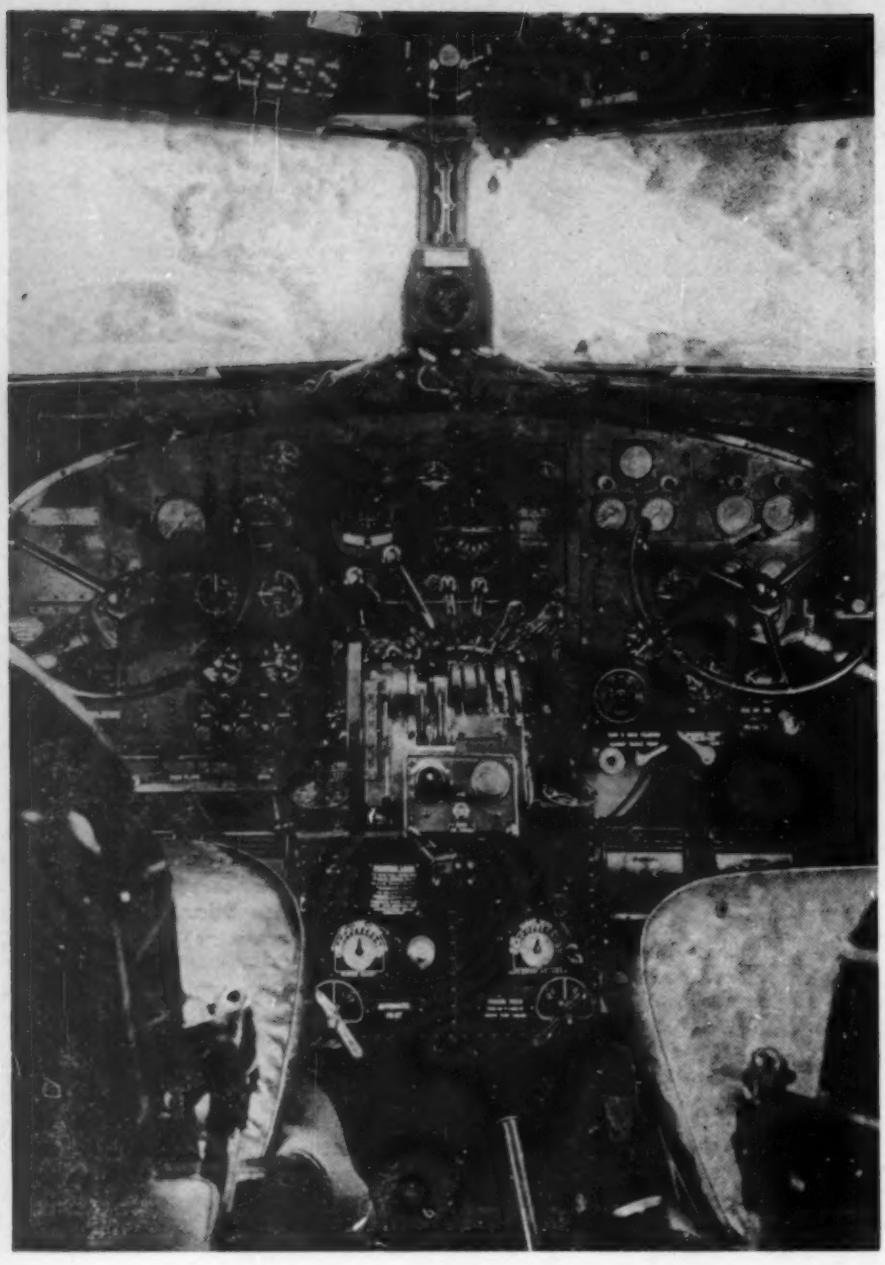
Let's look about, before we go to bed. The inside of the plane looks like a Pullman car. There are six sections of berths, uppers and lowers. Back near the entrance door is the electric kitchenette where food is kept hot or cold in insulated compartments. There is not enough room for a real kitchen on a plane, but we will find the meals are as good as if they came right out of the oven.

There are two separate dressing rooms. One for men, the other for women. Both have hot and cold running water. If you are man enough, you can use the electric razor in the men's dressing room tomorrow morning!

Toward the nose of the plane is the sky room. This has a table and two long seats. If you aren't ready to go to bed, we'll sit in the sky room and have a cup of chocolate or a glass of milk and cookies. The stewardess will bring refreshments any time we like.

Beyond the sky room is the controls cabin. Here the pilot and the co-pilot sit behind the controls and a large instrument board. This board is a complicated-looking affair (see photograph and diagram on next page), and makes you realize that navigating a big plane is no child's play.

The navigating instruments and



The photograph on the left shows the instrument board in the pilot's compartment of a Mainliner (built by Douglas). Below the photograph is a diagram, with numbers indicating the instruments and gauges on the board. • "The airplane is one of the simplest machines ever made by man," says the article "Learning to Fly" on page 15. But the successful navigation of a modern transport plane is certainly no simple job.

other aids to flying make travel through the air safer. Two of the most interesting of these instruments are the direction finder and the de-icer. The direction finder shows the pilot when he is off his course. The de-icer operates an inflatable rubber device on the leading edge of the wings, forcing off any ice that may have collected there. The collection of ice on the wings has been one of the worst hazards to all-weather flying.

When you get into your berth, you will find a light overhead, if you wish to read. Unless it is rough weather, you will hardly know the plane is moving. Once in a while you may feel a "bump." This is caused by going through a patch of air either hotter or colder than the air the plane has been flying through.

In the morning for breakfast you have fruit, cereal, sausages, eggs, toast and coffee. You may have it on a tray in bed, or on a table which hooks onto the wall, when your berth is made down.

Now what can you do? There isn't room to take a walk. But there are morning papers, magazines, and plenty of games to play. Let's play checkers first, because the checkers have magnets on them.

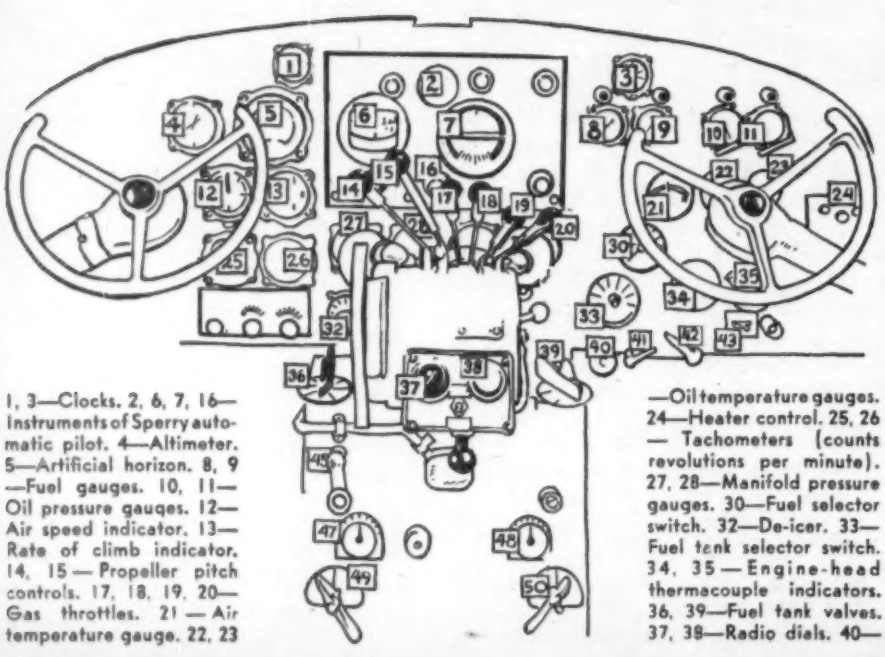
Then the stewardess will bring you binoculars and you can look at the scenery below. The farm lands look like huge green and red checkerboards themselves. But the mountains! Why, they look like little green molehills.

A little later, perhaps, we shall see clouds floating like big soapsuds below us. Or, perhaps, we shall go through a cloud. Then you can't see anything but a gray mist.

Before we know it, it will be lunchtime. Hungry again? Well, we have lamb chops, potatoes, peas, rolls, salad, ice cream and cake.

Think you can last until we get to San Francisco? That's easy. We're here. See, there's the Golden Gate bridge down below!

Happy landing!



1, 3—Clocks. 2, 6, 7, 16—Instruments of Sperry automatic pilot. 4—Altimeter. 5—Artificial horizon. 8, 9—Fuel gauges. 10, 11—Oil pressure gauges. 12—Air speed indicator. 13—Rate of climb indicator. 14, 15—Propeller pitch controls. 17, 18, 19, 20—Gas throttles. 21—Air temperature gauge. 22, 23—Oil temperature gauges. 24—Heater control. 25, 26—Tachometers (counts revolutions per minute). 27, 28—Manifold pressure gauges. 30—Fuel selector switch. 32—De-icer. 33—Fuel tank selector switch. 34, 35—Engine-head thermocouple indicators. 36, 39—Fuel tank valves. 37, 38—Radio dials. 40—Turn and bank selector. 41—Blower engine pump. 42—Vacuum pump selector. 43—Take-off signal for stewardess. 45—Wheel brakes (lock). 47—Rudder adjustment. 48—Aileron adjustment. 49—Automatic pilot switch. 50—Cross-feed emergency.

UNCLE SAM AT THE CONTROLS

The Government Watches Over the Air As It Does Over the Sea

ALTHOUGH men have been flying in America since 1903, twelve years ago an airplane was still so unusual that people stopped walking and craned their necks to watch it in the air. There were few airplanes and few pilots, and there were no licenses for either. If you could take an airplane up in the air and bring it down again, you were considered an aviator, and there was no one who could say you were not, or tell you what to do or not to do.

But at that time Uncle Sam saw that the airplane had already become important, and a law was passed that would regulate flying in the United States. This law was the Air Commerce Act of 1926, and it created the Bureau of Air Commerce, which has charge of all private and commercial flying in the country.

Safety First

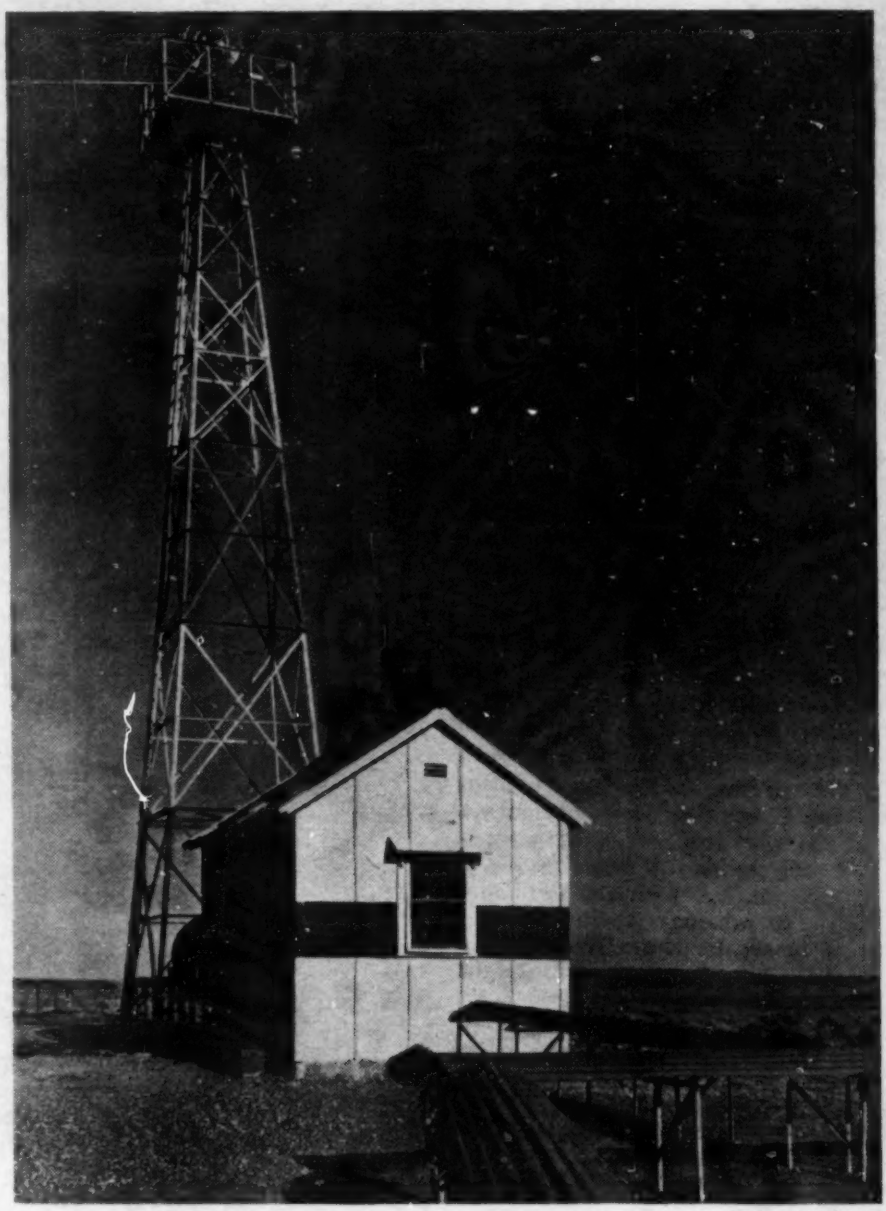
You cannot do anything in aviation without meeting the Bureau of Air Commerce. It licenses airplanes and pilots. It builds, operates and maintains airways over which passenger planes fly day and night. It sends out weather reports, with the cooperation of the U. S. Weather Bureau. It studies all types of planes, engines, propellors, instruments, parachutes and accessories. It inspects repairs to licensed aircraft, to make sure that the job has been done properly. It approves repair stations and flying schools. It investigates accidents, and issues reports as to what caused them—if the cause is known.

Uncle Sam's Bureau of Air Commerce is certainly "at the controls," protecting aviation and the public.

If you write the Bureau of Air Commerce, Washington, D. C., it will send you many of its publications free of charge. The Bureau has bulletins on aviation training, the regulation of air traffic, the building of airports, the development of airplane radio, the federal airway system, the air-traffic laws, the regulations for parachutes.

To most people, the most interesting part of the Bureau's service is the radio system it has set up for guiding transport planes. Let us see how this works—

In good weather the pilot engages in what is called "contact" flying. He can see where he is going and recognize landmarks on his route. At night, or in fog or rain or snow, he has other ways of finding his way, and is said to be flying "on instruments."



Ewing Galloway

One of Uncle Sam's Beacon Lights, which guides planes along the right route.

On a clear night the pilot can see the long chain of beacon lights that flash every 15 miles along his route. On his map, the pilot sees where these beacons are placed, and can tell immediately if he is following his course.

But if fog covers the ground, he must use his radio communication system. He wears a pair of ear-phones and listens for the "radio-range" signals. These signals keep him on his course, tell him whether he is to the right or to the left of it. The pilot is said to be "riding the radio beam" when he is being guided solely by the radio-range signals.

In addition to enforcing flying regulations, the Bureau licenses mechanics and parachute-riggers, inspects and approves airplanes, pilots, airports, emergency landing fields, flying schools and repair stations.

All this work, and the establishment of 20,000 miles of lighted airways, the setting up and operation of thousands of beacon lights, radio communication stations, radio-range beams, emergency landing fields, the printing of weather maps and ground maps, the operation of teletype machines (long-distance typewriters that send messages about the weather and instructions from one station to another)—all this has been accomplished in eleven years.

But there is still a great deal of work ahead.

UP FROM KITTY HAWK

*The True Story of the First Airplane Flight**

By Merrill Denison

THERE are two ways in which the story of aviation can be told. The way most common is to record the attempts that were made to fly with ornithopters, helicopters, gliders; to bow in turn to all the inventors whose efforts contributed in some small measure to the final success — the Englishmen, Sir George Cayley and Francis Wenham; the Frenchman, Jean Be Bris; the German, Otto Lilienthal; the Americans, John Montgomery and Octave Chanute. None flew, but each helped keep the dream alive. Told in this way the story of mechanical flight is a story of centuries of disappointment.

The other way of telling the same tale is to skip the years of failure that lie between Leonardo da Vinci and the final success, to jump from Italy to a small Ohio town in the 1870's and pick up the tale on an autumn evening when Bishop Milton Wright was returning home from one of his church trips, carrying in his pocket, a small toy for his two younger sons, Wilbur and Orville.

We can imagine Bishop Wright as he lets himself in the front door—a tall, bearded man, dressed in a frock coat, serious and dignified as befits his position, but with a genial smile for the surprise in store for his boys. Once inside, he sees a light coming from the kitchen where Mrs. Wright is working. Tiptoeing down the hallway. . . .

MRS. WRIGHT: Land sakes, Milton, how you scared me. I didn't expect you for another hour.

FATHER WRIGHT: *(Chuckling.)* No? Well, truth to tell, Susan, I wanted to hurry home. I bought something for the boys and . . .

MRS. WRIGHT: *(Smiling affectionately.)* What was it you wanted for yourself this time, Milton? Is it in this parcel?

FATHER WRIGHT: *(With quick anxiety.)* Oh, careful, dear! It's easily broken.

MRS. WRIGHT: *(Sagely.)* I understand. You want to have the fun of opening it yourself.

FATHER WRIGHT: *(Shamelessly.)* Of course, I do. Here, let me show you. *(Unwrapping the paper.)* There it is! The most ingenious thing I ever saw in my life.

MRS. WRIGHT: *(Doubtfully.)* But what is it, Milton? A toy?

FATHER WRIGHT: Toy? Yes . . . but its proper name is a helicopter. See, you wind up this elastic . . . these blades on top revolve . . . and the thing actually lifts itself off the ground Now . . . half a jiffy . . . Watch . . . *(There is a whirring sound and the small, batlike object darts suddenly across the kitchen.)* There! Isn't that about the most interesting thing you ever saw?

MRS. WRIGHT: Well, for goodness sake, Milton. It flies! Now, who in the world ever thought that up?

FATHER WRIGHT: Well, if you must know, it was an Italian gentleman named Leonardo da Vinci who had the idea first.

MRS. WRIGHT: And you went and bought that for Orv and Wilbur to play with?

A FEW DAYS LATER

FATHER WRIGHT: *(Looking at his wife and Orv and Wilbur.)* Well . . . aren't we all very quiet tonight?

MRS. WRIGHT: Oh, Milton, the boys have worn out the helicopter.

WILBUR: The elastic broke, Father.

FATHER WRIGHT: *(Solemnly.)* So . . . it's smashed already, is it?

WILBUR: It wasn't our fault, Father. . . .

MRS. WRIGHT: Don't be too angry with them, Milton.

FATHER WRIGHT: I'm not angry with them, Susan. I'm only curious to know what they're going to do about it. Well, boys?

ORVILLE: *(Bravely.)* We can try and fix it, can't we, Will?

WILBUR: *(More bravely even.)* Shucks, no. We'll make another, that's what we'll do, Orv. A bigger one that'll fly further and better. All we need is some cork and bamboo and rubber. Come on, Orv, we'll start in right now. I've got fourteen cents. . . .

"You see, you wind up this elastic . . . and it actually lifts itself off the ground."

FATHER WRIGHT: *(A little apologetically.)* Oh, I know I shouldn't have, Susan, but they'll enjoy it. And who knows, it may teach 'em something, too. Where are the young rapscallions? *(He opens the back door and calls.)* Orv! Wilbur! I've got something for you.

Little imagination is needed to picture the excitement of the next few days. The glistening, wonderful toy that soars upward to the ceiling and then flutters gently back to earth absorbs the waking hours of the two Wright boys, Wilbur, aged eleven, and his younger brother Orville, just reached seven. They call it "the bat" and put it through all sorts of tests indoors and out.

The tiny mechanical "bat," with wings that revolved so fast you couldn't see them, passed out of the picture, but the Wright boys went on tinkering, inventing, making and breaking and making over again. Blessed with far-seeing parents, the youngsters' love for things mechanical received every encouragement to grow.

GROUNDWORK FOR INVENTION

More significant, perhaps, than any other invention of their boyhood days was the homemade wood lathe,

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suggested by Orville and constructed by both of them out of a collection of odds and ends. But from it the sons of Bishop Wright gained a knowledge of mechanical principles and the habit of good craftsmanship.

During the summer of 1896, Orville had typhoid fever and was cared for jointly by Wilbur, a trained nurse and Katherine, their sister, then home on vacation from her teaching post at Oberlin College.

WILBUR: How's Orv, Katherine? About perished with this heat?

KATHERINE: No, he seems much better, Will. Go in and see him. *(Raising her voice.)* Oh, Orv, here's Will come back. . . .

ORVILLE: *(Cheerfully.)* Well . . . come on in! Howdy, Will, what's the news? Any excitement at the shop?

WILBUR: *(Seating himself at the head of the bed and picking up a palm-leaf fan.)* No, things've been pretty quiet, Orv. No chance of doing much business in this weather. Why, along about noon time you could have fried an egg on the pavement outside the store.

ORVILLE: Guess I'm not so bad off in bed after all, Will. Anything interesting in the paper?

WILBUR: Nothing much. There's one item though that I felt sorry over. That German fellow, Otto Lilienthal, was killed yesterday trying to fly one of those gliders he's been experimenting with.

ORVILLE: *(Gravely.)* Hard luck! How did it happen?

WILBUR: Lost his balance or something. Seems he hadn't quite solved the problem of maintaining equilibrium.

ORVILLE: That's a real tragedy. You know, Will, Lilienthal made some mighty valuable experiments. He probably would have got some place if he'd lived.

WILBUR: *(Curiously.)* What do you know about his experiments, Orv?

ORVILLE: Why, I've read about them off and on. Along with those of Maxim and Professor Langley. . . . Why?

WILBUR: Oh, it seems a little funny, that's all. I've been keeping up with all these flying experiments, too. Remember that helicopter father gave us when we were kids. . . .

ORVILLE: *(Laughing.)* Remember it! I should say I do. Gosh, we had fun with that . . . while it lasted. But do you remember those kites we used to make and sell? We made some pretty darn good kites. . . .

WILBUR: I know we did and I was just thinking about them. Say, Orv. . . .

ORVILLE: What is it, Will?

WILBUR: What do you say we look into this flying business seriously? You know, you and I might get somewhere working together.

ORVILLE: *(Thoughtfully.)* We might at that, if we went at it the right way. First, we ought to get all the books that have been published on the subject. I could read 'em while I'm getting well. . . .

WILBUR: *(With more excitement.)* And when we find out all there is in books, we'll test out things for ourselves, step by step. . . . Make models . . . go at it scientifically . . .

ORVILLE: *(Rising on one elbow.)* Yes, and not accept a hang thing until we prove to ourselves that it's right.

WILBUR: That's the only way, Orv. Build and experiment; tear down and build again and go on building till we know we've cracked the nut. . . .

The excited, intense voices brought Katherine's gently reproving presence, but the die was cast. The Wright brothers were pledged to a task that had defeated men all through the ages.

A FIRST SUCCESS

The next step nicely illustrates how quickly a keen, observant mind can profit by accident and chance. Toward ten o'clock on a July evening in 1899, Wilbur was at the bicycle shop which the brothers owned, about ready to close up, when a late customer trundled in a bicycle and propped it against the open door. As he came into the shop:

WILBUR: You got here just in time. Another five minutes, and I'd have been on my way home. Got a puncture, eh?

THE CUSTOMER: Yep, and I figure it ain't worth fixing, Wilbur. Got a good inner tube?

WILBUR: *(Taking a cardboard box down from the shelf.)* This one's about as good as any.

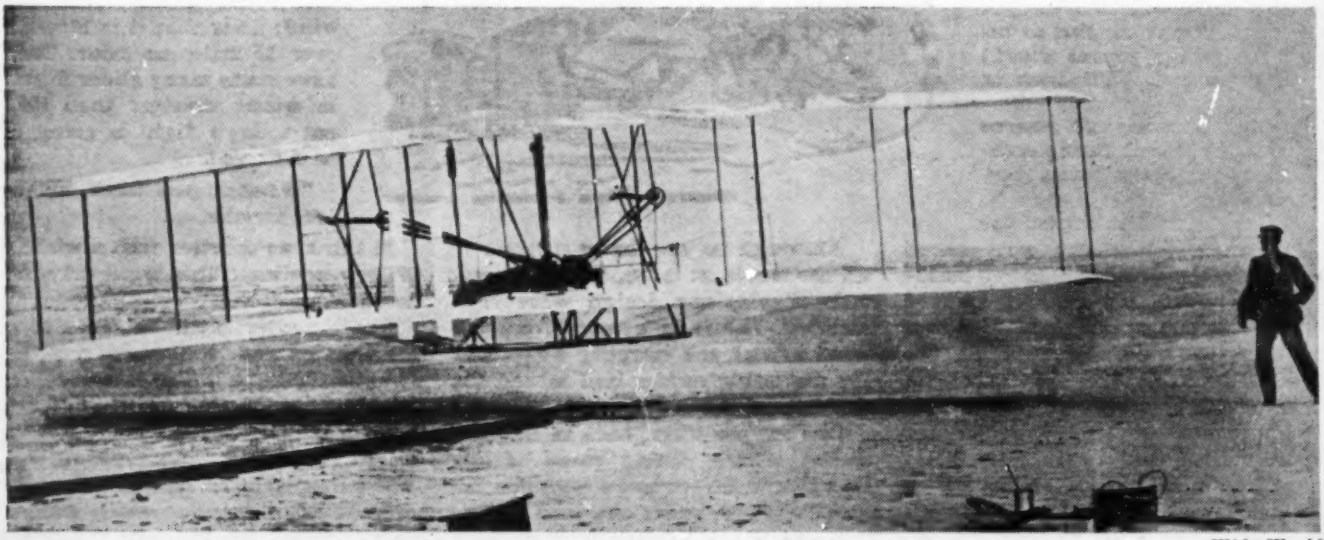
THE CUSTOMER: Let's have a look at it. *(As the customer examines the tube, Wilbur begins to twist the empty box idly in his fingers. And, twisting, he glances down. Suddenly his attention is riveted on what he is doing. After a careful examination of the tube, the customer puts his hand in his pocket.)* Guess, this is all right, Will. How much is it? *(But Wilbur pays no attention.)* Hey, Will! What's got into you? Are you deef or something? What are you doing there anyway? Twisting that box that way in your fingers?

WILBUR: *(Coming to a little.)* Eh, what's that?

CUSTOMER: Gosh, you acted like you was in a trance! What're you so all-fired interested in that there box for?

WILBUR: This? Oh, it's just given me an idea, that's all. Did you want the tube?

The customer disposed of, Wilbur closed up the shop and raced home to wait for Orville, out at a party with Katherine. About midnight the younger brother returned to find Wilbur seated in the living room, slowly twisting a small cardboard box first one way and then another between his hands. Orville immediately saw what Wilbur was driving at. If the wings could not be hinged, they could be twisted! Four cords attached to the four corners, and the wings could be warped in any direction. The problem of lateral



Wide World

Actual photograph of the flight at Kitty Hawk, N. C., Dec. 17, 1903. Orville Wright at the controls; Wilbur on ground.

balance was solved at last. A basic principle essential to all airplanes has been established through the unconscious manipulation of a cardboard box. The brothers plan to build a glider.

KITTY HAWK

Will the glider fly? Impatiently the brothers speed up their work. At last, the glider needs but one thing to complete it, the front horizontal rudder. They stand looking at the glider resting on the sand outside the work tent at Kitty Hawk, N. C., the place recommended to them by the U. S. Weather Bureau.

ORVILLE: *(Impulsively.)* Will, let's try it!

WILBUR: Without the front rudder, Orv?

ORVILLE: Sure, why not? If it's going to work at all, it'll work without it. What we're interested in is lateral balance and that front rudder won't affect that one way or the other.

WILBUR: You're right, Orv!

ORVILLE: *(Impetuously.)* Come on then! Grab hold of that other wing.

WILBUR: *(More deliberate, as usual.)* Wait, wait. Hold your horses half a jiffy. We'll need a towrope.

ORVILLE: There's a coil of rope right inside the tent flap. I'll get it.

WILBUR: That's the ticket, Orv. Give me some of that rope.

ORVILLE: *(Tossing Will a coil.)* Where'll we tie it? Front outside struts?

WILBUR: That should do. 'Bout a third of the way up, I'd say.

ORVILLE: *(Deftly slipping a half-hitch around his strut.)* Ready, Will?

WILBUR: All ready, Orv! Swing your wing back a couple of feet so's we'll face the wind head on. *(Orv quickly obeys.)* That's got it! Now, for the big moment. Will it carry one of us? Like to shake on it, Orv?

ORVILLE: Let's take it as shook. I want to see if the hang thing works.

WILBUR: Come on then! Straight down the slope. Run, Orv, run!

ORVILLE: Come on, Will, faster! *(The two brothers race down the dune. Very shortly something begins to happen which Orv is the first to notice. With a joyous shout.)* She's rising, Will! Look at her

WILBUR: *(Casting all reserve aside for once.)* Rising nothing, Orv. She's flying, boy, she's flying!

Straining at the ropes, the large glider took the air, soared upward, thrilled its happy builders by the steady pull it exerted on their outstretched arms. But in a few minutes they had it on the ground again. Would it still fly with one of them on board? Stretching himself flat between the center struts, Will gave Orv the signal. Almost before he knew it, Will was in the air. The glider behaved as well with its first passenger as it had without.

Although the total time in the air was actually little more than two minutes, the brothers felt well satisfied with their labors. Their theories were proved correct. Handled like a kite, the glider would carry a person; its elevator rudder worked, and the warping principal maintained lateral balance.

Abandoning the glider to the mercies of the Carolina sand dunes, the two men returned to Dayton, satisfied, on the whole, with the month's work but without any real appreciation of the truly tremendous progress they had made. The following July (1901) saw them back at Kitty Hawk again, this time with a larger glider. The new one had been designed according to the air pressures as set forth in the tables compiled by Lilienthal and Chanute. These tables were later found to be unreliable. The two brothers had wrongly concluded that they, and not the tables were in error, and their work that summer proved most disheartening.

Disappointed, the brothers returned to Dayton in mid-August, almost determined to give up. But with their passionate zeal for nailing down facts, they again started from scratch, this time to find out for themselves what air pressures actually were under different conditions.

And again trifling chance played its part. Lying awake in the mosquito-ridden tent one night, Orville had one of his penetrating flashes of genius. Why not hinge the stubborn unpredictable r u d d e r? Why not make it movable? Just as Orville had instantly adopted Wilbur's proposal to warp the wings, so Wilbur at once saw the value of the hinged rudder.

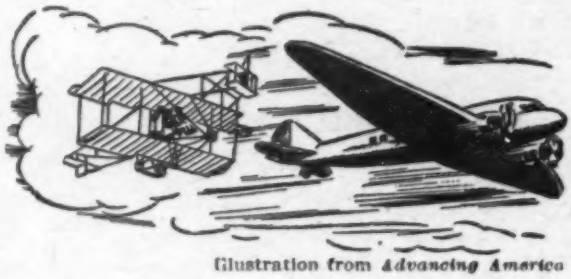


Illustration from *Advancing America*

Although no one knew it, least of all the world at large, all the essentials of airplane design were now satisfied. The facts wrested from the wind tunnel, the warping wings and the moveable rudder had solved the problem of human flight.

One can see them, back in Dayton, seated in the dining room of the Hawthorne Street home with the father, now 74 years old, and Katherine, home for a short visit. And the talk, as always, turning to Kitty Hawk adventures. . . .

FATHER: *(In his deep rumbling voice.)* But tell me, boys. . . . You've gone this far. What's the next step?

WILBUR: *(Thoughtfully.)* Well, Father. . . .

KATHERINE: *(Impulsively.)* I think the very first thing they should certainly do is patent their inventions.

ORVILLE: *(Casually.)* I doubt whether we'll ever make a penny out of them. Still, I suppose we might as well have whatever scientific credit's coming to us. . . .

FATHER: *(Explosively.)* Most assuredly you should! To patent your discoveries is nothing but the most ordinary common sense. But what I want to know is this—what is the *next* step to be?

WILBUR: *(Smiling.)* Power, Father. That's next. We're sure about our bird. Now we've got to give it a heart . . an engine . . so it can fly itself.

KATHERINE: *(Intensely interested.)* Do you really believe you can do that, Will?

FATHER: *(Skeptically.)* But where do you boys propose to find the engine? Are any made light enough?

ORVILLE: *(Laughing.)* I'm afraid you've put your finger on our trouble, Dad. If we're going to have an engine, we'll have to make it ourselves.

One day in February, 1903, many residents of Dayton heard a most terrific series of explosions coming from the vicinity of the Wright Cycle Company's workshop. The bewildering noise was made by the brothers' homemade, four-cylinder airplane motor, receiving its first bench test. It ran better than had been expected, but there was really nothing remarkable about it except the persistence of the two men who made it.

THE FIRST FLIGHT

December 17 dawned cold and wintry, with a chill north wind blowing.

Breakfast over, Wilbur checks the velocity of the wind; finds that it is blowing over 25 miles an hour. They have made many glider flights in winds stronger than this, but today's flight is going to be different.

"What do you think, Will?" asks Orville.

"I think we'd better wait a while," Wilbur replies. "This wind may die down before long."

Shortly after breakfast, four men are seen crossing the sands from the direction of the village; three are from the Life Saving station, and the other a lumber buyer from a nearby town. These four, and a young boy who turns up later, are all the audience that gathers to watch one of man's great scientific conquests. . . .

At ten o'clock, the brothers and

the handful of watchers are standing outside the low workshed. . . .

ORVILLE: What do you think, Will? Doesn't look as if this wind's going to slacken any.

WILBUR: Nope, doesn't look like it, Orv.

1ST MAN: From what I know of the weather here, I'd say that wind's more likely to freshen than anything.

2ND MAN: Yep, if you boys are going to try that flying dingus today you might as well do it now.

WILBUR: Let's put her on the track, Orv. *(He turns to the others.)* A couple of you take the landing skis, the rest spread out along the wings.

(Slowly, the two Wrights, their helpers and the visitors walk the biplane out of the shed. . . .)

WILBUR: Easy now, boys. Let her come down gently. *(The biplane is lowered to its position on the monorail.)* That's it.

4TH. MAN: *(To another of the guests.)* 'Spose they'll get this thing to actually fly?

3RD MAN: Gosh hang it, they deserve to. Been monkeying around with this invention of theirs for over six years now.

1ST MAN: *(To Wilbur.)* How're you feeling, Mr. Wright? Pretty confident?

WILBUR: *(Modestly.)* I think we've got it, but you can never tell. Lots of other men have got this far, you know. . . .

2ND MAN: But none of 'em ever flew?

WILBUR: Exactly. I've still got my fingers crossed.

ORVILLE: Let's start the engine, Will. Get it warmed up.

WILBUR: Good idea. I'll crank it. Is that holding rope all right?

(The holding rope is tested, the benzine turned on and the spark set. Wilbur gives a crank, and the 12 H. P. motor breaks into a thunderous roar with flames shooting from its open exhaust. . . .)

WILBUR: It's your turn, Orv. Crawl aboard.

ORVILLE: *(Now in position on the biplane, lying prone behind the engine.)* Let her go when I give the signal! And hang onto that right wing. Try and keep her level on the track. All right. Now!!

(The machine moves forward. Wilbur runs beside it, one hand on the wing tip, in the other a stop watch. The biplane has gone about forty feet when. . . .)

1ST MAN: *(He can't believe his eyes.)* Look! It's lifting.

2ND MAN: *(Excitedly.)* You're right, you're right, b'gosh. Orv's off the ground.

THE BOY: I'll never get anyone to believe me when I tell 'em.

WILBUR: *(In a state of wild excitement.)* Keep going, Orv, keep going!!!

THE FIVE: By gosh, they've done it! He's flying! The darn thing's in the air!!

Let's Read

A Column About Books by Helen M. Burgess

NORTH TO THE ORIENT. By Anne Morrow Lindbergh. Published by Harcourt, Brace and Co.

THERE are a great many books about experiences in the air. So many of them are excellent, too, both those written for young people and those for adults.

One that bridges the gap is *North to the Orient*. It has no age limit in interest: readers from 12 to 80 have thoroughly enjoyed it because it appeals to them in so many different ways.

Perhaps you have a great desire to take a long journey by airplane. You dream about it: all the preliminary plans about the route; supplies of fuel and food at strategic points; personal possessions to take with you. Here you find the Lindberghs doing just this.

Perhaps you have wanted to be a radio operator on an airplane. You may watch Mrs. Lindbergh learning how to be one before the flight, and how important her help is later. When they are returning from the Arctic Circle where it never gets very dark in the summer, and they are flying towards Nome, suddenly and unexpectedly to them, twilight begins and they realize that it will be dark before they can land. Then Mrs. Lindbergh's attempt to learn by radio "when does it get dark at Nome?" is a request for vital information.

From Alaska they travel down the coast of Asia to Japan, where the plane cracks up and they barely escape with their lives.

PRIVATEER AHOY! By E. A. Stackpole. Published by William Morrow & Co.

THIS is a story of the War of 1812 and the blockade of the American coast by the English fleet. Mr. Stackpole lives on Nantucket Island, off the coast of Massachusetts, and his stories usually deal with the activities of the islanders in crises in our history.

For a moment it seems strange to find our hero, sixteen-year-old Thad Jenkins, living in the Mohawk Valley in New York State. However, his great-grandfather had been a sea-captain and he has always wanted to see the ocean and live on a ship. Most unexpectedly, he has an opportunity to join three soldiers who have been fighting in the campaign on the Great Lakes and along the Canadian border. They believe the war can be ended by a decisive victory on the sea.

Seth Coffin comes from Nantucket and he is eager to acquire a ship of his own. Thad joins him and his two friends in this venture. In attempting to run the blockade, they are captured off Sandy Hook. From then on things happen thick and fast. They manage to seize a ship and escape to Nantucket. Seth has a plan to help American ships through the blockade. Sometimes he is successful, sometimes not. There are several fights and narrow escapes, including the war's only naval battle.

The end papers of the book give you excellent maps so that you can follow the story very carefully.

Beyond the Gates of Hercules

From "NORTH AMERICA," by Lucy S. Mitchell. Published by The Macmillan Co.

Which road shall we take? the road of the sea, with rolling waves and whirling screw, the salt on your lips, the white-flung spray, and a streamer of smoke against the blue?

Which road shall we take? the river road, with dipping paddle and slipping canoe, and trees that bend to brush as you pass as only the trees of a river do?

Which road shall we take? a road of steel, with a clickety-clack along the track? or the whizzing wheel of an automobile? or a mountain trail from a horse's back?

Which road shall we take? a road of the air, a giant bird—with you and me?

There's many roads to take, my dear, so let's be off! Which road shall it be?

LUCY S. MITCHELL.

WAR-PLANES

Official photograph U. S. Navy

NAVY PLANES FOR DEFENSE. These pursuit ships are known as F2-F1's. With their fat, stubby bodies, they are built to take the great strain of high speed flight and daring stunts they perform.

WHEN the Wright Brothers succeeded, in 1903, in making an airplane that actually flew, they perhaps dreamed of the day when an airplane would fly around the world.

But they certainly did not dream that a day would come when their invention would be used to bring death and suffering to people.

Yet, only eleven years after the Wright Brothers took off at Kitty Hawk, airplanes were being used as "wings of death" in the World War of 1914-1918.

That war, more than anything else, speeded up the development of the airplane. Up to that time not very much progress had been made in improving airplane performance.

With the war, the nations bent every effort to make better planes. And all for the purpose of destruction and defense against "the enemy."

With airplanes, one army could see the movements of its enemy, and train its guns upon it. From airplanes, an army could take photographs from the air; fight other planes; drop bombs on ships, armies, cities, homes, hospitals, churches, schools, museums—on anything.

Today you see the horror repeated. But with airplanes so much faster, bigger and better able to stay in the air a long time, the damage planes can do is ten times worse than it was in 1914-1918.

Right now, in the wars in Spain and China, bombing planes are dropping their charges of death on thousands of people in the streets and in their homes.

Have you seen the movie newsreels of the bombings of Shanghai? If you saw the uncensored ones, you saw the most ghastly sights that have ever been photographed.

The editor of Junior Scholastic has, on his desk, "stills" from these movie newsreels. But he has decided not to publish them here, because they show human beings torn apart, arms, heads, legs blasted loose from bodies. They show big piles of killed Chinese men, women and children in the streets of their cities, where bombs from Japanese planes brought their lives to an end. The photographs show some of the thousands and thousands of injured, writhing in their pain. There are so many injured that they cannot get treatment for their injuries.

Some people think such pictures should never be shown. Others think they should be, because if people can see how horrible modern war really is, they will do everything in their power to oppose it.

Why do nations use planes to destroy cities, instead of using them only to attack the army and navy of the enemy? What can be gained by destroying cities and killing the civilian population?

They do it in order to break down the spirit of the people who carry on the work of the cities while their armies are at "the front." These people are called "the civilian population." You also will see them referred to as *non-combatants.* This word means "not fighters." Break down their spirit, fill them with terror and fright, and they are more likely to demand that their army surrender.

Nations are fast building more and more war-planes. At present, Russia has the most with 4,500; Italy comes next with 3,900; then follow Great Britain, 3,500; France, 3,000; Germany, 2,500; United States, 2,200; Japan, 2,000. The figures for the European nations are changing as fast as new planes can be built. These nations, living in fear of war, are in a mad race to get ahead of one another in preparation for a possible war.

BOMBS FOR THE ARMY AIR CORPS. This photograph shows flying cadets of the U. S. Army Air Corps learning how bombs are made. They then learn how bombs are aimed and dropped to earth.

Official photograph U. S. Army Air Corps

HEADLINE NEWS

The Supreme Court Meets; Justice Black Takes His Seat

"OYEZ! OYEZ! the Court is now in session."

These words greeted the nine Justices of the Supreme Court when they opened the new term of the court last week.

You will see the word "bench" used very often in connection with courts. Newspapers say: "The bench will announce its decision tomorrow"; or "The judge was appointed to the bench." Used in these ways, *bench* means more than the actual seat on which a judge sits. It has come to mean a number of things—the courtroom, the court system, a particular judge, or all judges taken as a group. Its meaning depends on the way it is used in a sentence.

Here, when we say that the Supreme Court Justices took their places on the bench, we mean that they took their places in the courtroom.

What do these nine men do? What is the Supreme Court?

The word "supreme" means highest, most powerful. The Supreme Court is the highest and most powerful court of the United States. It stands at the top of a whole system of courts.

Before there were any courts, people settled their quarrels by fighting each other. Some still prefer this old way of doing things, but the law says they must take their quarrels to court. This means that instead of fighting, they argue in court before a judge. This is called a *trial*. In certain kinds of trials, a jury of twelve citizens hear the arguments, and make the decision, the judge acting as a sort of umpire.

If a man is not satisfied with the decision made by the court to which he has gone, he may ask a higher court for another hearing of his argument. The last court to which he can go is the Supreme Court of the United States. The Supreme Court has nine judges (justices) and no jury. The decisions of the Supreme Court are final and must be obeyed.

You hear a lot about the Supreme Court these days. That is because many of the laws passed by Congress and President Roosevelt have been taken to the Supreme Court by people who objected to them. The Supreme Court then decided whether or not the law agreed with the Constitution of the United States.

In recent years, the Supreme Court has ruled that some of the New Deal laws were unconstitutional. President Roosevelt and his New Deal advisers and Congressmen said that the Supreme Court was blocking their plans.

When the Supreme Court makes a decision about something, each one of the nine Justices can vote *for* or *against* it, as he desires.

Sometimes all nine Justices agree, and when they do their decision is said to be *unanimous*.

Frequently they don't agree. If one Justice does not agree with the other eight, he is said to *dissent*. The decision is then called an 8 to 1 decision. Sometimes decisions are 7 to 2, 6 to 3, and even 5 to 4.

Last spring, one of the nine Justices retired. This gave President Roosevelt a chance to appoint a Justice to take the place of Justice Van Devanter, the one who retired.

President Roosevelt appointed Senator Hugo L. Black. The Senate confirmed (okayed) the appointment.

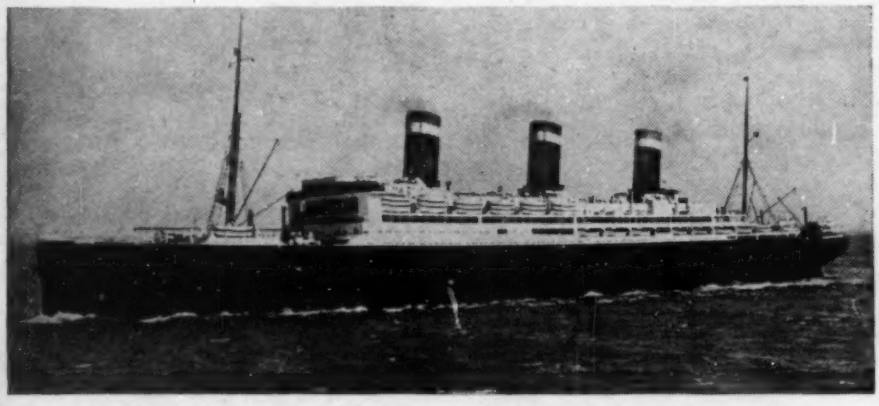
When Justice Black was in Europe on his vacation recently, he was accused of being a member of the hated Ku Klux Klan.

On his return from Europe, Justice Black spoke over the radio, and admitted that he had been a member of the Klan. But he said he resigned when he became a Senator.

Justice Black did not say why he joined the Klan in the first place. Most people think that he joined the Klan "for political purposes." This means that he did it in order to get Klan members to vote for him.

When the Supreme Court took the bench last Monday for its new term, Justice Black was in the seat reserved for him.

New efforts are now being made to force him out of the Supreme Court.



The Leviathan, once a "prisoner of war," now to be sold for junk.

A Famous Ship Goes to the Junk Pile

What happens to big ocean liners when they are too old to be used? One of them, the United States Liner *Leviathan*, is going to be sold for scrap. In her place a new and modern ship is to be built by order of the U. S. Maritime Commission.

The *Leviathan* is no ordinary boat. She has a strange history. When she was launched in 1913 she was the biggest ship afloat. She was no American ship then, but a German one, and her name was *Vaterland* (a German word which means fatherland or homeland).

The *Vaterland* was in New York harbor when the Allies (England, France and Russia) set up a blockade to stop German ships. Germany ordered the *Vaterland* to stay at her dock in Hoboken, N. J. Her German crew remained on board. Then, in 1917, when they heard that the United States had declared war on Germany, they wrecked the ship's engines. The *Vaterland's* crew were taken to a prison camp. The ship's engines were repaired, and the *Vaterland* was renamed *Leviathan*. It became the American army's most important transport ship, and carried many soldiers to France.

What an odd career for a ship! First, she was a peaceful passenger ship. Then she was a prisoner of war. Then she carried American soldiers to fight against the country that had owned her. Now she is to be scrapped and her metal used to build more guns and shells.

Giants and Yanks Play "Subway" World Series

As you read this, the world series of 1937 will be coming to a close, or it may already be over. If either team (the N. Y. Yankees or the N. Y. Giants) wins in a "clean sweep" (four victories in a row), or by the margin of four to one, then the world series will be over by the time you read this.

This year the world series is called a "nickel series" or a "subway series." Whenever both New York teams happen to win their league championships, every game in the world series takes place in New York City.

The Yankees have such famous stars as Joe DiMaggio, the best outfielder in baseball (see front cover); Lou Gehrig, called "the Iron Horse," because he has played close to 2,000 games without missing one; Bill Dickey, the best catcher in baseball today; and three of the league's finest pitchers in "Goofy" Gomez, Charlie Ruffing and Monte Pearson.

The Giant line-up was studded with stars like "King" Carl Hubbell, master of the screwball and the best pitcher in both leagues; Cliff Melton, the second pitcher in history to win 20 games in his first season in the major leagues; Mel Ott, the National League's best right-fielder, who was converted into a third baseman where he still is tops; "Jojo" Moore and Hank Leiber.

JOBS IN AVIATION

More Applicants Than Jobs for Pilots and Stewardesses

Official photograph U. S. Army Air Corps

Aerial photography requires special training and cameras with special lenses.

HOW MANY boys in your room want to be pilots? How many girls want to be air stewardesses? Count them just for the fun of it!

Do you know that for every aviation worker in the air there are *nine* on the ground all the time? And that three girls out of each million will probably become air stewardesses?

But aviation is a fast-growing industry and there will be need for more workers in it. Many interesting positions are opening in this industry.

Health is the first requirement for flying, according to "This Business of Flying" by Al Williams in the May-June, 1936, issue of the magazine *Careers and Hobbies.*

The air corps of the Army and Navy train aviators in special schools. To get into one of the schools you must have had at least two years of college education, and be able to pass a very strict physical examination. If you do not have college training, it is still possible to get in by passing a written examination on various subjects, including mathematics. Students at the Army and Navy schools do not have to pay anything. The Government pays the students, each receiving $75 per month, besides food and lodging.

In the same issue of *Careers and Hobbies,* Marjorie Woodings has a message for the girls in the article, "Three in a Million." She also predicts future expansion in commercial aviation, and she thinks that before long there will be a demand for as many as 1,000 more air hostesses.

Wide World

Youngster! Ed Somers, 13-yr. old son of a congressman and World War ace, is ready for license, but he must wait.

But she, too, says you have to be an exceptional person and that the requirements are strict. You must be a registered graduate nurse, weigh between 100 and 118 pounds, be no taller than five feet five inches and between the ages of 21 and 26, before you can qualify for training.

Many questions asked by young people about aviation are answered in a book called *This Flying Game* by Arnold and Eaher (published by Funk and Wagnalls). They do not make it sound easy to become a pilot. If you are not in the Army or Navy schools, you would have to take private lessons. These are expensive. There are aviation schools which take pupils who can afford to pay tuition. The best of these schools charges $4,000 for a two-year course. This is far beyond the reach of most young men who want to become flyers.

The ground jobs offer interesting work. At the big airports, the man in the traffic control tower, and the man who handles the radio communications, have exciting duties and big responsibilities.

There are eighteen different kinds of employment on an air line, and ten different kinds of jobs in the aircraft, engine, propeller and accessories manufacturing plants.

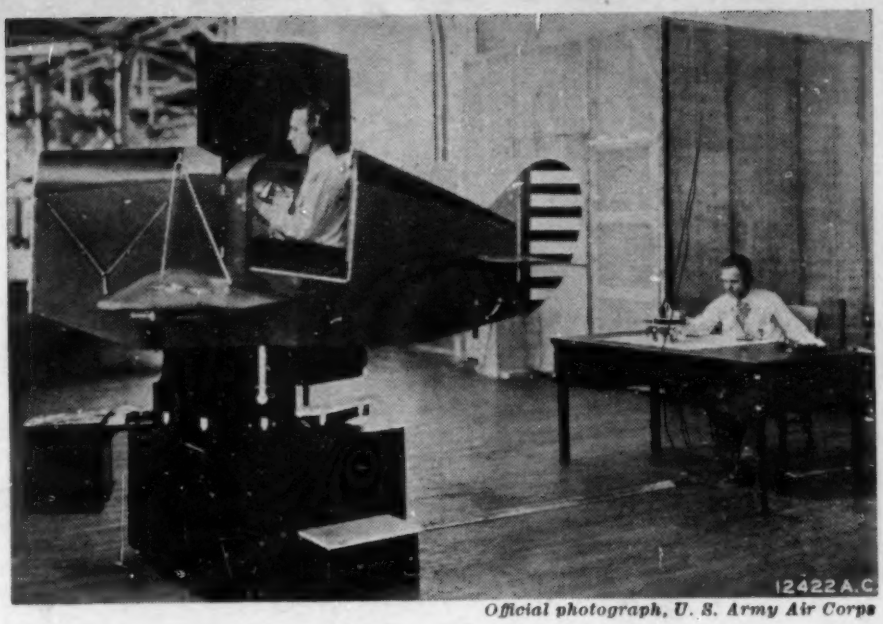
Some of these jobs are: pilots, co-pilots, radio operators and engineers, stewards and stewardesses, dispatchers, meteorologists, engine mechanics, instrument technicians, operations managers, maintenance superintendents, traffic agents and repair men.

In the factories are the aeronautical engineers, test pilots, salesmen and demonstrators, draftsmen, welders, woodworkers, sheet metal workers, machinists, assembly-men and helpers.

TWA

Air hostesses in training. Here they are studying the plane's heating system.

Photograph on the right shows the "Link trainer," for training in "blind" flying. The instructor at the table records the flight operations of student in cockpit.



Official photograph, U. S. Army Air Corps

MORE POWER TO YOU

Learning To Fly

DO YOU stick your head out of the window every time you hear an airplane? Does your heart beat faster when you hear the drone of a motor in the sky? If so, you've probably been bitten by the flying-bug!

When you become 16, you are eligible for a student pilot's license. Before you become 16, it is against the law to operate a plane. The law is a federal one. (See "Uncle Sam at the Controls" on page 7.)

This law allows you only 1½ hours of flying instruction *in the air* without a student pilot's license.

After this, if you want to continue learning to fly, and are 16, you can apply for a student pilot's license. To get it you have to pass a physical examination by a doctor appointed by the Bureau of Air Commerce, and you pay a fee of $10.

Let us say the doctor passes you. He finds your body healthy and your ears, your balance and your eyes adaptable to flight. You report to your instructor, and what will you learn?

Well, you will learn that the airplane is one of the simplest machines ever made by man. It has only three "controls" to master: the "stick," the rudder-pedals and the throttle. The stick, which is placed right between your knees when you sit in the cockpit, controls the plane in this way: when you push it forward, the plane goes down; when you pull it back the plane goes up; when you press it to one side or another, the plane "banks," or tips up on its side. The stick is used in banking, together with the rudder-pedals, to make a turn. You press the stick to the left and press the left rudder-pedal with your foot, and the plane turns to the left like a car making a turn on a banked road. You press the stick to the right and press right rudder, and the plane turns to the right, in a shallow or a steep bank, depending on how much stick and rudder you "give" in either direction. The rudder-pedals also steer you right or left in level flight. The throttle is the plane's accelerator, and you keep your hand on it at all times.

Well, there you are sitting in the rear cockpit of the plane, your instructor in front so he can give you signals. He not only can show you what to do, but he can correct any mistakes you may make, for he has a "dual" or duplicate set of controls in the front cockpit.

The plane is sitting on the ground, its nose higher than its tail. You slowly push the throttle forward with your left hand, opening it and giving more gas to the engine. The propeller spins faster and faster, the plane starts to roll across the ground, and you use the rudder pedals and the stick to keep the plane running straight and the wings level with the ground. The plane is moving fast now, and you press the stick forward. The tail comes up, and you are rolling on your two front wheels. You wait till the plane has gathered speed, then you gently pull the stick back toward you, and the plane leaves the ground and climbs into the air. You're flying.

Up and up you go, until you are at, say 500 feet. You throttle the engine down a third of the way, and the plane cruises through the air. You keep the nose of the plane on the horizon, and "correct" with your controls for any gust of air, for the plane is very sensitive to wind.

Houses are very small now, cars look like little beetles and people are mere bugs. Your instructor points to the left. Keeping the nose of the plane on the horizon, you press left stick and left rudder. The plane tips up and makes a graceful curve. At first it is not as easy as it looks, and your instructor will have to help you around the curves.

Now it's time to land. You pick out the spot you want to land on, and point the nose of the plane down by pushing the stick forward. You pull the throttle all the way back, so that the engine is idling. You are in a glide, and the earth is coming "up at you." Then, depending on the strength of the wind or the condition of the air, you "level off," pulling up the nose of the plane. You coast swiftly across the ground in level flight, losing speed. You pull the stick gently toward you, the nose comes up and the ship settles to the ground to a perfect three-point landing (you hope).

You will find that it is hard to relax at first. You will find that you have a tendency to "over-control" — make wide jerky movements with the stick and the rudder-pedals. But gradually you learn *co-ordination.*

And so the average young man or woman will find that it will take him approximately 10 hours before his instructor will get out of the front cockpit and say, "Take it off yourself!" That is the first great moment in the flying student's life.

But now that you have "soloed" you will find that you really know nothing! You will find that you are just beginning to learn, and you will require 50 hours of solo-flight before the government will examine you and give you a private pilot's license, that will entitle you to fly anywhere and take a passenger (but not for hire). Another 150 hours and the mastery of many maneuvers is required before you will be considered a good enough flier to take passengers or students for hire.

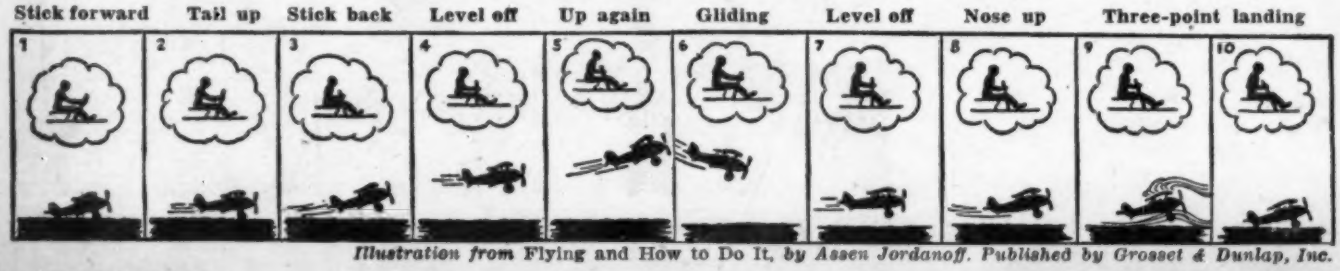


Illustration from Flying and How to Do It, *by Assen Jordanoff. Published by Grosset & Dunlap, Inc.*

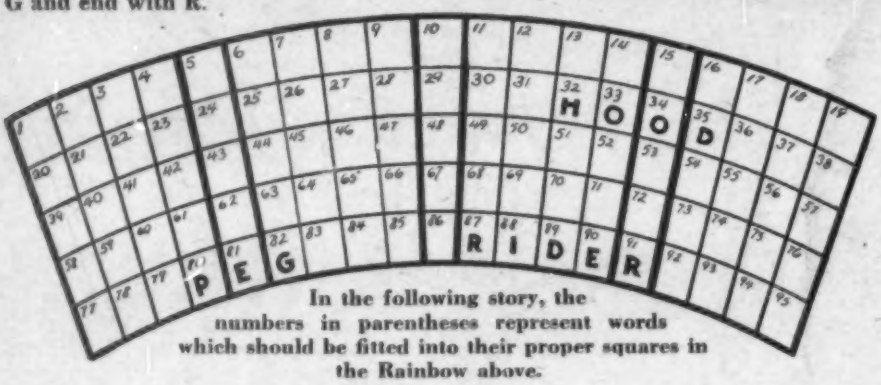
MATCH YOUR WITS

The Weekly Puzzle Page

By EUGENE SHEFFER

RAINBOW SKY RIDE

Here's an interesting puzzle that tells a story of aviation. There are three RAY words, the only vertical words in the puzzle. These words fit into the squares enclosed by the heavy outline. All the other words in the puzzle are ARC words. These ARC words are the horizontal words of the puzzle, and they overlap. The last letter of the first word begins the first letter of the next word, and so on. In the story below, each missing word is shown by a series of dashes with numbers before it. These numbers represent the first and last letters of each word in the rainbow design below. We are starting you off by giving you three ARC words, HOOD (32-35), PEG (80-82) and RIDER (87-91), which we print in their proper spaces. Using this clue, you know that (82-87) must begin with the letter G and end with R.



In the following story, the numbers in parentheses represent words which should be fitted into their proper squares in the Rainbow above.

WHEN the French aviator Louis Bleriot made a successful flight across the English (58-64) - - - - - - - - in 1909 in his frail little (1-9) - - - - - - - - - -, he little dreamed that less than twenty years later a young American aviator named Charles A. (24-32) - - - - - - - - - would (14-19) - - - - - - on a historic flight that would carry him nonstop across the Atlantic Ocean from New York to Paris. Each of these memorable flights required its share of (10-86) - - - - - and skill to bring them to a happy (68-70) - - -. Lindbergh was aided in his flight by a carefully prepared weather (44-46) - - -, but today science has provided aviation with additional safeguards, like the (91-95) - - - - - (41-44) - - - - which keeps the flier on his route no matter how poor the visibility may be. Lindbergh has never had a serious accident throughout his flying career, although once, in Mexico, while flying with his fiancee Anne Morrow as passenger, his landing gear jammed, and he was forced to come down on only one (20-24) - - - -. By a skilful (39-41) - - - of maneuvering, he managed to bring the plane to a stop on an (54-57) - - - - keel. Earlier in his career, he was forced to (64-68) - - - - - his plane and bail out with his (46-54) - - - - - - - - - - when his (9-14) - - - - - - stalled and the (5-81) - - - - - began to (35-38) - - - - earthward.

Every airship today, whether it be a tiny (77-80) - - - - or a huge bomber, is equipped with a fine motor. The (82-87) - - - - - - is the only type of airplane that functions without a (15-91) - - - - -.

Today people have become so accustomed to airplanes that they scarcely glance upward when they hear the (70-76) - - - - - - - of their motors.

WORD BUYING

The object of this puzzle is to add as few letters as possible before or after each pair of letters to make a word. Each letter that you add "costs" one point. Thus TOP in the fourth line would cost one point, but OPEN or ROPE would cost two points. If no word can be thought of to build on the letters of any line, the penalty for that line is 15 points. No proper names or abbreviations may be used, nor may any letters be inserted between the two that are given on the chart.

You can make a class game of this by preparing your own charts. Merely turn to any page of the magazine and combine the first letter in the first line with the first letter in the second line, then the third and fourth, the fifth and sixth, etc. The player with the lowest cost wins the game.

		Points
.....	AA	.....
.....	UI	.....
.....	TR	.....
.....	OP	.....
.....	GL	.....
.....	IA	.....
.....	RN	.....
.....	OE	.....
	TOTAL	

NON-STOP FLIGHT

We are about to start on a tour that will take us to many parts of the world. Below is a list of names familiar to you from your study of geography. The last three letters of the first name are the same as the first three letters of the second. The stars show how many letters of any name are used to begin the next. The final letter of the last name is the same as the first letter of the first name.

When you have completed this puzzle, see if you can make up a similar list of your own.

1. - - - - * * *
2. - - - - * *
3. - - - - * * *
4. - - - - - - - - - - - - * *
5. - - - - - - * *
6. - - - - - * * *
7. - - - - - - - *

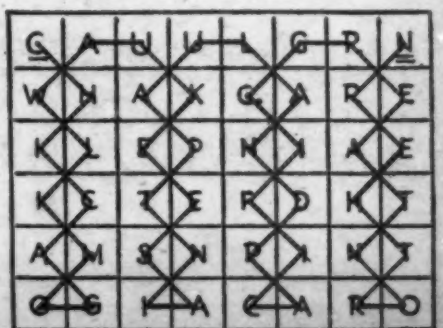
1. A Southern state.
2. A large river of South America.
3. A province of Canada.
4. The capital of Brazil.
5. The scene of Sir Walter Raleigh's failure at colonization.
6. City in Florida on an island in the Gulf of Mexico.
7. A republic on the Baltic Sea.

LAST WEEK'S ANSWERS

The WORD SQUARE comes out as follows:

RAIL
AERI
IRON
LINK

Your PLUS AND MINUS form should look like this:

N	TO PUT IN: INSERT	NAMES AN ATTEMPT: TRIES	A RELIGIOUS CEREMONY: RITE	S
E	ENTERTAINED: AMUSED	FRENCH AUTHOR OF "THE THREE MUSKETEERS": DUMAS	BARRIERS TO KEEP BACK WATER: DAMS	U
W	MOVE UNSTEADILY FROM SIDE TO SIDE: WABBLE	A TOWER IN THE BIBLE: BABEL	CAPABLE: ABLE	B
Y	MARK THRU CHARACTER: ERASE	TO MAKE A SOLEMN OATH: SWEAR	ORGANS OF HEARING: EARS	W
O	TO MAKE A GIFT: DONATE	ITALIAN POET WHO WROTE "THE DIVINE COMEDY": DANTE	CARE FOR SOMEONE: TEND	A
R	A PIE CRUST: PASTRY	LIKE PASTE IN COLOR: PASTY	A BUGLE CALL: TAPS	Y
K	THE GOAL IN AN INDOOR GAME: BASKET	ANY ANIMAL: BEAST	TO HELP; SUPPORT: ABET	S

Here below is the way your RAILROAD RIDE should look, if you did it as directed—